CROSSROADS OF IDAHO (PWS 5270022)
SOURCE WATER ASSESSMENT FINAL REPORT

September 27, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for the Crossroads of Idaho, Jerome, Idaho* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The Crossroads of Idaho (PWS #5270022) water system consists of one well. The well was constructed in 1988 and the system currently serves 44 people through four connections.

Final susceptibility scores are derived from system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Potential contaminants are divided into four categories, inorganic contaminants (IOCs, e.g. nitrates, arsenic), volatile organic contaminants (VOCs, e.g. petroleum products), synthetic organic contaminants (SOCs, e.g. pesticides), and microbial contaminants (e.g. bacteria). The different wells are subject to various contamination settings, therefore separate scores are given for each type of contaminant.

In terms of total susceptibility, Well #1 rated moderate for IOCs, VOCs, SOCs, and automatically high for microbials due to the storage tower's overflow pond existing within 50 feet of the well when it is full. If not for the automatic rating microbials would have rated moderate for the well. The moderate ratings were derived from moderate system construction and hydrologic sensitivity scores, and land use scores which were high for IOCs, VOCs and SOCs, and moderate for microbial contaminants.

No VOCs or SOCs have ever been detected in either well. Trace amounts of the IOCs barium, chromium, sodium, fluoride, and nitrate have been detected. Nitrate concentrations have ranged between 2.3 to 2.6 milligrams per liter (mg/L), well below the maximum contaminant level (MCL) of 10 mg/L as set by the Environmental Protection Agency (EPA). The potential for nitrate levels to exceed MCLs is possible as Group 1 sites near the well indicate the presence of high nitrate concentrations in other areas around the water system. In addition, Well #1 exists in a county with high nitrogen fertilizer, herbicide, and ag-chemical use. Total coliform has been detected (July 2000 and November 1994) in the distribution system.

A sanitary survey conducted in 1995 characterized the system's most important improvements as diverting the parking and driving area's drainage away from the fire hydrant and constructing the storage tower overflow so that the sanitary setback distance is never impeded.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific purpose.

For Crossroads of Idaho, drinking water protection activities should first focus on maintaining the requirements of the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Any spills from the potential contaminant sources listed in Table 1 of this report should be carefully monitored, as should any future development in the delineated areas. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water area should be implemented. Also, disinfection practices should be implemented if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead. Most of the designated areas are outside the direct jurisdiction of Crossroads of Idaho. Partnerships with state and local agencies and industry groups should be established and are critical to success.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation is near urban and residential land use areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. EPA. There are transportation corridors near the delineation, therefore the Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Twin Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR THE CROSSROADS OF IDAHO, TWIN FALLS, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings, used to develop this assessment, is also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the EPA to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of this assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The DEQ recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Crossroads of Idaho (PWS #5270022) water system consists of one well. The well was constructed in 1988 and the system currently serves 44 people through four connections.

No VOCs or SOCs have ever been detected in either well. Trace amounts of the IOCs barium, chromium, sodium, fluoride, and nitrate have been detected. Nitrate concentrations have ranged between 2.3 to 2.6 mg/L, well below the MCL of 10 mg/L as set by the EPA. The potential for nitrate levels to exceed MCLs is possible as Group 1 sites near the well indicate the presence of high nitrate concentrations in other areas around the water system. In addition, Well #1 exists in a county with high nitrogen fertilizer, herbicide, and ag-chemical use. Total coliform has been detected (July 2000 and November 1994) in the distribution system.

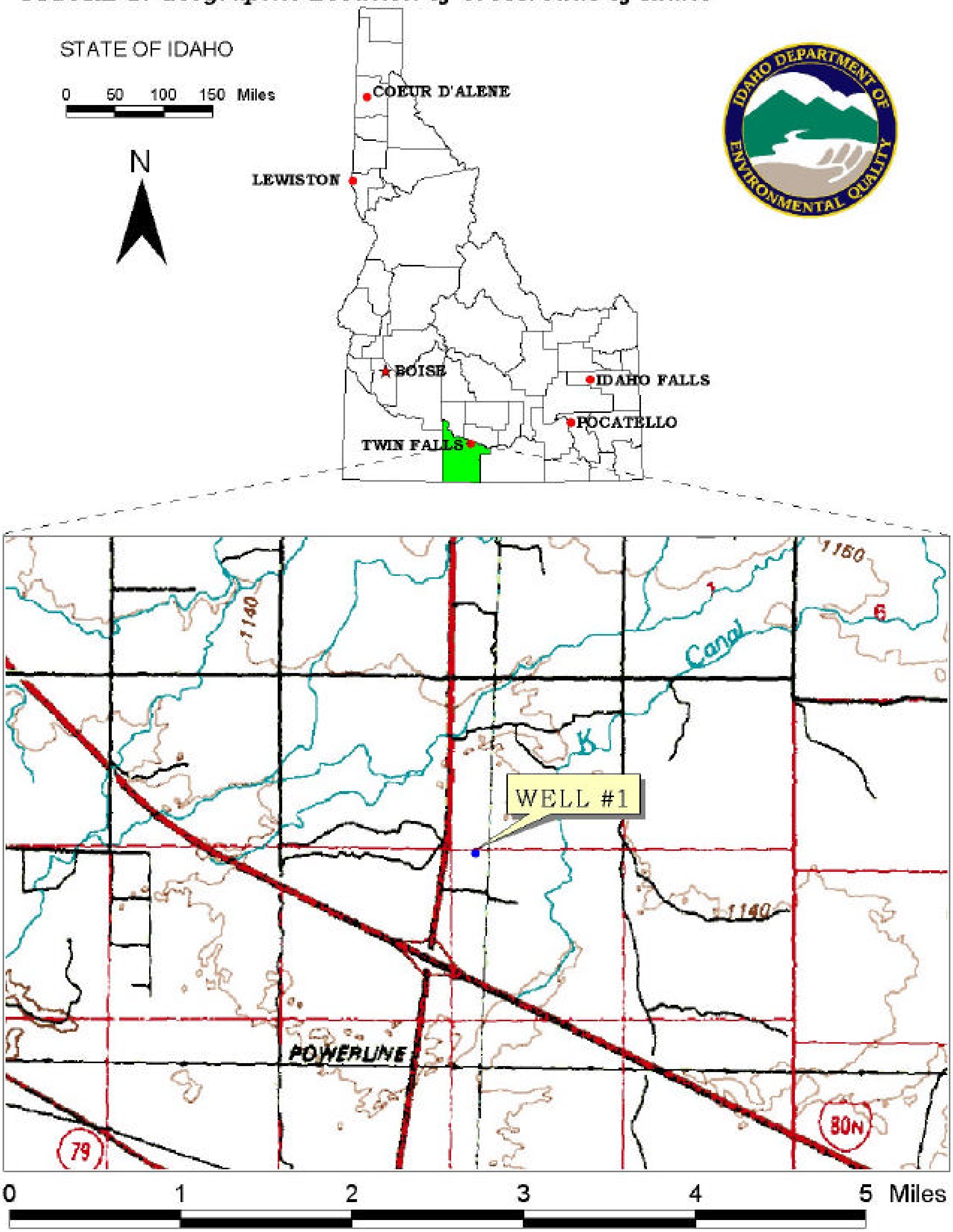
Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. Washington Group, International (WGI) used a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) time-of-travel (TOT) zones for water associated with the Southwest Eastern Snake River Plain (SW ESRP) aquifer. The computer model used site-specific data, assimilated by DEQ and WGI from a variety of sources including local area well logs and hydrogeologic reports summarized below.

The ESRP is a northeast trending basin located in southeastern Idaho. The 10,000 square miles of the plain are filled primarily with highly fractured layered Quaternary basalt flows of the Snake River Group, which are intercalated with sedimentary rocks along the margins (Garabedian, 1992, p. 5). Individual basalt flows range from 10 to 50 feet thick, averaging 20 to 25 feet thick (Lindholm, 1996, p. 14). Basalt is thickest in the central part of the eastern plain and thins toward the margins. Whitehead (1992, p. 9) estimates the total thickness of the flows to be as great as 5,000 feet. A thin layer (0 to 100 feet) of windblown and fluvial sediments overlies the basalt.

The layered basalts of the Snake River Group host one of the most productive aquifers in the United States. The aquifer is generally considered unconfined, yet may be confined locally because of interbedded clay and dense unfractured basalt (Whitehead, 1992, p. 26). Whitehead (1992, p. 22) reports that well yields of 2,000 to 3,000 gal/min are common for wells open to less than 100 feet of the aquifer. Lindholm (1996, p. 18) estimates aquifer thickness to range from 100 feet near the plain's margin to thousands of feet near the center. Models of the regional aquifer have used values ranging from 200 to 3,000 feet to represent aquifer thickness (Cosgrove et al., 1999, p. 15).

FIGURE 1. Geographic Location of Crossroads of Idaho



Regional ground-water flow is to the southwest paralleling the basin (Cosgrove et al., 1999; deSonneville, 1972, p. 78; Garabedian, 1992, p. 48; and Lindholm, 1996, p. 23). Reported water table gradients range from 3 to 100 ft/mile and average 12 ft/mile (Lindholm, 1996, p. 22). Gradients steepen at the plain's margin and at discharge locations.

The majority of aquifer recharge results from surface water irrigation activities (incidental recharge), which divert water from the Snake River and its tributaries (Ackerman, 1995, p. 4, and Garabedian, 1992, p. 11). Natural recharge occurs through stream losses, direct precipitation, and tributary basin underflow.

The Southwest Margin of the ESRP hydrologic province is the regional aquifer's primary discharge area. Interpretation of well logs indicates that a 1- to 23-foot-thick layer of sediment overlies the fractured basalt aquifer in Jerome County, and that an 8- to 410-foot-thick layer of sediment overlies the same aquifer in southern Minidoka and Power Counties. Published geologic maps of the Snake River Plain (Whitehead 1992, Plates 1 and 5) indicate there is 100 to 500 feet of Quaternary to Tertiary Basalt aged compacted to poorly consolidated sediments located in the Heyburn area (north of the Snake River near Burley). The saturated thickness of the regional basalt aquifer for the Southwest Margin is estimated to range from less than 500 feet near the Snake River to 1,500 feet near Minidoka.

A published water table map of the Kimberly to Bliss region of the aquifer (Moreland, 1976, p. 5) indicates that the ground-water flow direction in the Southwest Margin is similar to that depicted at the regional scale (e.g., Garabedian, 1992, Plate 4).

Annual average precipitation for the period 1951 to 1980 is 9.6 inches in both Twin Falls and Burley (Kjelstrom, 1995, p. 3). The estimated recharge from precipitation in the Southwest Margin ranges from less than 0.5 inch to more than 2 in./yr (Garabedian, 1992, p. 20). Kjelstrom (1995, p. 13) reports an annual river loss of 110,000 acre-feet to the aquifer for the 34.8-mile Minidoka-to-Milner reach of the Snake River. River gains of 210,000 acre-feet for the 21.5-mile Milner-to-Kimberly reach, and 880,000 acre-feet for the 20.4-mile Kimberly-to-Buhl reach are reported for the same period.

The delineated source water assessment area for the Crossroads of Idaho can best be described as a triangular area originating at the wellhead and extending approximately 45 miles eastward and widening to 15 miles at it's most eastward end (Figure 2). The actual data used by WGI in determining the source water assessment delineation area is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and the Wayside Estates and from available databases.

The dominant land use outside the Crossroads of Idaho area is predominantly irrigated agriculture. Land use within the immediate area of the wellhead consists of some residential property, but mostly agricultural land.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A contaminant inventory of the study area was conducted in June and July of 2001. This involved identifying and documenting potential contaminant sources within the Crossroads of Idaho Source Water Assessment Areas through the use of computer databases and Geographic Information System maps developed by DEQ.

The delineation of Well #1 has 121 potential point sources (See Table 1, Figure 2). These potential contaminant sources include Underground Storage Tanks (UST), Leaking Underground Storage Tanks (LUST),mines, a landfill, dairies, a waste land application site (WLAP), and deep injection wells. Additionally, Highway 24 and 25, Eastern Pacific Railroad, and Milner-Gooding Canal, and the North Side Canal cross the delineation. If an accidental spill occurred in one of these sources, IOCs, VOCs, SOCs, or microbial contaminants could be added to the aquifer system.

Table 1. Crossroads of Idaho, Well #1, Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	UST site, farm; closed	0-3 YR	Database Search	VOC, SOC
2	dairy, <=200 cows	0-3 YR	Database Search	IOC, Microbials
3	dairy, 201-500 cows	0-3 YR	Database Search	IOC, Microbials
4	dairy, 201-500 cows	0-3 YR	Database Search	IOC, Microbials
5	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
6	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
7	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
8	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
9	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
10	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
11	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
12	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
13	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
14	deep injection well, unknown status	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
15	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
16	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
17	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
18	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
19	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
20	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
21	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
22	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
23	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
24	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
25	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
26	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
27	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
28	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
29	deep injection well, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
30	recharge, proposed	0-3 YR	Database Search	IOC
31	recharge, unused	0-3 YR	Database Search	IOC
32	landfill, transfer station, active	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
33	UST site; not listed; open	3-6 YR	Database Search	VOC, SOC
34	dairy, 2000+ cows	3-6 YR	Database Search	IOC
35	dairy, <=200 cows	3-6 YR	Database Search	IOC
36	dairy, 201-500 cows	3-6 YR	Database Search	IOC
37	mine, pumice	3-6 YR	Database Search	IOC, VOC, SOC
38	mine, pumice	3-6 YR	Database Search	IOC, VOC, SOC
39, 44	LUST site, UST site; farm, closed, site cleanup completed	6-10 YR	Database Search	VOC, SOC
40	UST site; commercial, open	6-10 YR	Database Search	VOC, SOC
41	UST site; farm, open	6-10 YR	Database Search	VOC, SOC
42	UST site; farm, open	6-10 YR	Database Search	VOC, SOC
43	UST site; gas station, open	6-10 YR	Database Search	VOC, SOC
45	UST site, federal non-military, closed	6-10 YR	Database Search	VOC, SOC
46	dairy, <=200 cows	6-10 YR	Database Search	IOC
47	dairy, <=200 cows	6-10 YR	Database Search	IOC
48	dairy, <=200 cows	6-10 YR	Database Search	IOC
49	dairy, <=200 cows	6-10 YR	Database Search	IOC
50	dairy, <=200 cows	6-10 YR	Database Search	IOC
51	dairy, 201-500 cows	6-10 YR	Database Search	IOC
52	dairy, <=200 cows	6-10 YR	Database Search	IOC
53	dairy, <=200 cows	6-10 YR	Database Search	IOC
54	dairy, <=200 cows	6-10 YR	Database Search	IOC
55	dairy, <=200 cows	6-10 YR	Database Search	IOC
56	dairy, 201-500 cows	6-10 YR	Database Search	IOC
57	dairy, 201-500 cows	6-10 YR	Database Search	IOC
58	mine, gold	6-10 YR	Database Search	IOC, VOC, SOC
59	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
60	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
61	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
62	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
63	deep injection well, temporary abandon	6-10 YR	Database Search	IOC, VOC, SOC
64	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
65	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
66	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
67	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
68	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
69	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
70	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
71	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
72	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
73	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
74	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
75	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
76	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
77	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
78	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
79	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
80	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
81	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
82	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
83	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
84	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
85	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
86	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
87	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
88	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
89	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
90	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
91	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
92	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
93	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
94	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
95	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
96	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
97	deep injection well, temporary abandon	6-10 YR	Database Search	IOC, VOC, SOC
98	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
99	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
100	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
101	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
102	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
103	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
104	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
105	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
106	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
107	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
108	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
109	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
110	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
111	deep injection well, temporary abandon	6-10 YR	Database Search	IOC, VOC, SOC
112	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
113	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
114	deep injection well, permanent abandon	6-10 YR	Database Search	IOC, VOC, SOC
115	deep injection well, active	6-10 YR	Database Search	IOC, VOC, SOC
116	WLAP site, municipal	6-10 YR	Database Search	IOC
	North Side Main Canal	0-3 YR	GIS map	IOC, VOC, SOC, Microbials
	Milner-Gooding Canal	0-6 YR	GIS map	IOC, VOC, SOC, Microbials
	Eastern Pacific Railroad	0-3, 6-10 YR	GIS map	IOC, VOC, SOC, Microbials
	Highway 25	0-3 YR	GIS map	IOC, VOC, SOC, Microbials
	Highway 24	6-10 YR	GIS map	IOC, VOC, SOC

[1] UST = Underground Storage Tank, LUST = Leaking Underground Storage Tank, WLAP = Waste Land Application Site
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

The hydrologic sensitivity was moderate for Well #1 (see Table 2). The vadose zone is composed of predominantly impermeable materials and an aquitard is present. Scores were increased because the depth to first water was less than 300 feet and areas soils are moderately- to well-drained.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in Sanitary Surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

The system construction score was moderate for the well (see Table 2). Based on the sanitary survey, the wellhead and surface seal appear to be maintained, both wells are outside the 100 year floodplain and are protected from surface flooding. The score was increased because, according to the well log, the casing and annular seal do not extend into low permeability units, nor is the well's highest production coming from more than 100 feet below the static water level.

The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all Public Water Systems (PWSs) to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the requirements include casing thickness, well tests, and depth and formation type that the surface seal must be installed into. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Twelve to twenty inch diameter wells require a casing thickness of at least 0.375-inches. Well tests are required at the design pumping rate for 24 hours or until stabilized drawdown has continued for at least six hours when pumping at 1.5 times the design pumping rate. The system received an additional point in the system construction category because the well casing was too thin. Although it may have met standards when it was constructed, current regulations are stricter.

Potential Contaminant Source and Land Use

The well rated high for IOCs (e.g. arsenic, nitrate), SOCs (e.g. pesticides), VOCs (e.g. petroleum products), and moderate for microbial contaminants (e.g. bacteria). The USTs, LUST, dairies, injection wells, mines, WLAP, landfill, the transportation corridors and railroad, as well as the irrigated agricultural land and canals contributed the largest numbers of points to the contaminant inventory ratings. County level nitrogen fertilizer use, county level herbicide use, and total county level agricultural chemical use are rated as high for the wells. The delineations also cross a nitrate priority area.

Final Susceptibility Rating

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well, despite the land use of the area, because a pathway for contamination already exists. Additionally, the storage or application of any potential contaminants within 50 feet of the wellhead will lead to an automatic high score. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time-of-travel zone (Zone 1B) and much agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, Well #1 rated automatically high microbial contaminants due to the overflow pond existing within 50 feet of the wellhead when it is full.

Table 2. Summary of the Crossroads of Idaho Susceptibility Evaluation

Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	H	H	H	M	M	M	M	M	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H*= Automatic high due to overflow pond existing within 50 feet of the wellhead.

Susceptibility Summary

In terms of total susceptibility, Well #1 rated moderate for IOCs, VOCs, SOCs, and automatically high for microbial contaminants. The automatic high rating is due to the storage tower's overflow pond existing within 50 feet of the well when it is full. If not for the automatic rating microbials would rate moderate. The moderate ratings were derived from moderate system construction and hydrologic sensitivity scores, and land use scores which were high for IOCs, VOCs and SOCs, and moderate for microbial contaminants.

No VOCs or SOCs have ever been tested in either well. Trace amounts of the IOCs barium, chromium, sodium, fluoride, and nitrate have been detected. Nitrate concentrations have ranged between 2.3 to 2.6 mg/L, well below the MCL of 10 mg/L as set by the EPA. The potential for nitrate levels to exceed MCLs is possible as Group 1 sites near the well indicate the presence of high nitrate concentrations in other areas around the water system. In addition, Well #1 exists in a county with high nitrogen fertilizer, herbicide, and ag-chemical use. Total coliform has been detected (July 2000 and November 1994) in the distribution system.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For Crossroads of Idaho, drinking water protection activities should first focus on maintaining the requirements of the sanitary survey. Any spills from the potential contaminant sources listed in Table 1 of this report should be carefully monitored, as should any future development in the delineated areas. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. No chemicals should be stored or applied within the 50-foot radius of the wellhead. As most of the designated areas are outside the direct jurisdiction of the Crossroads of Idaho, partnerships with state and local agencies and industry groups should be established and are critical to success.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation is near urban and residential land use areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. There are transportation corridors near the delineation, therefore the Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Twin Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

Assistance

Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Twin Falls Regional DEQ Office	(208) 736-2190
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper (mailto:mlharper@idahoruralwater.com), Idaho Rural Water Association, at 1-208-343-7001 for assistance with drinking water protection strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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Attachment A

Crossroads of Idaho Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report   Public Water System Name : CROSSROADS OF IDAHO   Well# : WELL #1

Public Water System Number 5270022   06/10/2002 9:56:32 AM

1. System Construction

		SCORE
Drill Date	03/28/1988	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1994
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		4

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		3

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2

Potential Contaminant / Land Use - ZONE 1B

		IOC	VOC	SOC	Microbial
Contaminant sources present (Number of Sources)	YES	35	31	31	32
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	4	4	4	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	25 to 50% Irrigated Agricultural Land	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		16	14	14	10

Potential Contaminant / Land Use - ZONE II

		IOC	VOC	SOC	Microbial
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	25 to 50% Irrigated Agricultural Land	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0

Potential Contaminant / Land Use - ZONE III

		IOC	VOC	SOC	Microbial
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0

	IOC	VOC	SOC	Microbial
Cumulative Potential Contaminant / Land Use Score	26	22	24	12
4. Final Susceptibility Source Score	12	11	12	11
5. Final Well Ranking	High	High	High	High